

B2
Conced

6. (Amended) The liquid crystal device according to Claim 1 or 2, using a normally-white mode wherein the high-voltage side of the driving voltage is used as black.

B3

9. (Amended) The liquid crystal device according to Claim 1, wherein said liquid crystal device is an electrically controlled birefringence type.

B4

13. (Amended) The liquid crystal device according to Claim 3, wherein black is displayed by performing phase compensation.

B5

16. (Amended) The liquid crystal device according to Claim 3, using a normally-white mode wherein the high-voltage side of the driving voltage is used as black.

Remarks

The claims are 1-3, 5, 6, 9, 13 and 16, with claim 1 being the sole independent claim. Claims 4, 7, 8, 10-12, 14, 15 and 17-22 have been cancelled without prejudice or disclaimer. Claim 1 has been amended to clarify the invention. In particular, claim 1 has been amended to set forth that a direction of uniaxial orientation of liquid crystal molecules on rubbing alignment layers formed on upper and lower substrates is either parallel or anti-parallel and that a pre-tilt angle is changed to compensate for a change in birefringence. The remainder of the amendments to the claims are formal in nature. Applicants submit that no new matter has been added. Reconsideration of the claims is respectfully requested.

Claims 1 and 7 stand rejected under 35 U.S.C. §112, second paragraph. Insofar as the rejection is based upon cancelled claim 7, Applicants submit that the rejection is moot and should be withdrawn. Further, in light of Applicants' amendment of claim 1 in accordance with the Examiner's kind suggestion, Applicants respectfully request withdrawal of this rejection as based upon claim 1.

Claims 1, 5, 6, 8, 9 and 18 stand rejected under 35 U.S.C. §102(e) as being anticipated by Kaneko (U.S. Patent No. 6,141,070). Claims 3, 4, 12-17 and 19-22 stand

rejected under 35 U.S.C. §103(a) as being obvious over Kaneko in view of Yamada (U.S. Patent No. 6,344,883). Claim 7 stands rejected under 35 U.S.C. §103(a) as being obvious over Kaneko. Claim 10 stand rejected under 35 U.S.C. §103(a) as being obvious over Kaneko in view of Matsumoto (U.S. Patent No. 6,078,375). Claim 11 stands rejected under 35 U.S.C. §103(a) as being obvious over Kaneko in view of Okada (U.S. Patent No. 6,221,444). Insofar as these rejections are based upon cancelled claims 4, 7, 8, 10-12, 14, 15 and 17-22, Applicants submit that the rejections are moot and should be withdrawn; Applicants respectfully traverse the remaining rejections.

The present invention is directed to a liquid crystal device comprising upper and lower substrates with nematic liquid crystal sandwiched therebetween. Importantly, a direction of uniaxial orientation of liquid crystal molecules on rubbing alignment layers formed on the upper and lower substrates is either parallel or anti-parallel. Further, a temperature change of a retardation value of the liquid crystal device is reduced by changing a pre-tilt angle of the liquid crystal molecules in order to compensate for a change in a birefringence of the nematic liquid crystal due to changes in temperature. In this way, deterioration of contrast of the liquid crystal device is reduced.


Kaneko is directed to a normally black liquid crystal display with a twisted compensator. Kaneko describes with regard to Figure 11, at column 16, lines 40-63, that a retardation film 17 is disposed exterior to a liquid crystal device in order to compensate for retardation changes of the liquid crystal device elements. At column 16, line 58, Kaneko details "... in a temperature compensating-type retardation film in which liquid crystal molecules are impregnated in the polycarbonate film or a portion of the liquid crystal molecules is connected to open-chain polymer molecules, the retardation value varies according to the temperature change". Clearly, the retardation film (impregnated with liquid crystal disposed outside of the liquid crystal device) compensates for a retardation change of the liquid crystal device elements. This is directly in contrast with the presently claimed invention wherein changing the pre-tilt angle compensates for a retardation change.

In addition, Yamada does not remedy this deficiency of Kaneko. Yamada contains no disclosure or suggestion of compensating for a retardation change of a liquid crystal device by changing a pre-tilt angle of liquid crystal molecules within the device elements.

In sum, neither Kaneko nor Yamada, whether considered alone or in combination, anticipates or renders obvious the present invention. Neither reference discloses or suggests one of the key features of the present invention, namely self-compensation for a retardation change of liquid crystal elements by changing a pre-tilt angle of liquid crystal molecules within the elements. Accordingly, Applicants respectfully request withdrawal of the prior art rejections.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


Attorney for Applicants
Registration No. 42,667

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200



VERSION SHOWING CHANGES MADE TO CLAIMS

1. (Amended) A liquid crystal device comprising:
[two substrates] an upper substrate and a lower substrate; and
nematic liquid crystal sandwiched between said upper and lower substrates;
wherein [the] a direction of uniaxial orientation of liquid crystal molecules
on rubbing alignment layers formed on upper and lower substrates is either parallel or anti-
parallel; and

wherein a temperature change of [the] a retardation value of said liquid
crystal device is reduced by changing [the orientation state] a pre-tilt angle of said liquid
crystal molecules so as to compensate for a change in [the] a birefringence of said nematic
liquid crystal [composition] due to changes in temperature.

2. (Amended) [A] The liquid crystal device according to Claim 1, wherein
the refractive index anisotropy of a liquid crystal composition having said nematic liquid
crystal as the primary component thereof at 30°C is 0.150 or more, and the pre-tilt angle of
liquid crystal molecules at 30°C at the substrate interface is [10° or more and 45° or less]
from 10° to 45°.

3. (Amended) [A] The liquid crystal device according to [either] Claim 1 or
2, wherein the orientation of said upper and lower substrates is provided by an organic
orientated film having a vertical or high pre-tilt angle, providing uniaxiality.

5. (Amended) [A] The liquid crystal device according to [any one of the
Claims] Claim 1 or 2, wherein black is displayed by performing phase compensation.

6. (Amended) [A] The liquid crystal device according to [any of the Claims]
Claim 1 or 2, using a normally-white mode wherein the high-voltage side of the driving
voltage is used as black.

RECEIVED
DEC 11 2002
TECHNOLOGY CENTER 2800

9. (Amended) [A] The liquid crystal device according to Claim 1, wherein said liquid crystal device is an [ECB (Electrically Controlled Birefringence)] electrically controlled birefringence type.

13. (Amended) [A] The liquid crystal device according to Claim 3, wherein black is displayed by performing phase compensation.

16. (Amended) [A] The liquid crystal device according to Claim 3, using a normally-white mode wherein the high-voltage side of the driving voltage is used as black.